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Invention Disclosure Sheet

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CT Engineering
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DEPARTMENT
SECTION

15-CT-6017

To: SUSAN DONAHUE, W-409
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Dynamic Cardiac Phantom**Purpose:**

Testing of image generation algorithm for cardiac imaging using CT requires phantoms that can mimic cardiac motion. Such phantoms are not available either as standard products or as custom products from phantom manufacturers. This document describes the construction of a phantom that can mimic true cardiac motion.

Proposal:

Construct a hollow phantom using expandable material. The expandable material could be made to move by pumping and removing water into the hollow object. To mimic cardiac motion into the inflatable object following methods are proposed

1. Modulate the pumping rate in a deterministic way. The modulation will be based upon a motion profile calculated based on volume change at different phases of the heart, such as rapid filling phase, slow filling phase, slow emptying rate, rapid emptying rate etc. Typical duration of each of these phases for a period of 1000 ms is given below

Slow empty phase: 100 ms
Rapid empty phase: 150 ms
Change over to filling phase: 50 ms
Rapid filling phase: 100 ms
Slow filling phase: Period - 500 ms
Change over to empty phase: 100 ms

2. The period from one cycle to the next could vary up to 20%. The amount of variation should be random based upon uniform distribution

3. To make the motion more realistic EKG traces from real patient should be used. Patient EKG wave form should be analyzed and the six phases mentioned above should be entered into a programmable device. The programmable device will use the stored data to modulate the pump.

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